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**METHOD OF MANUFACTURING A POWDERED  
FLAVORING AND PRODUCT CONTAINING SAID  
POWDERED FLAVORING** [Funmatsukoryo no  
seizoho oyobi gai funmatsukoryo-o ganyusuru shokuhin]

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[54] Title of the Invention: **METHOD OF MANUFACTURING A POWDERED FLAVORING AND PRODUCT CONTAINING SAID POWDERED FLAVORING**

[57] Abstract:

**[The Problem]** To provide a method of manufacturing a powdered flavoring that has both improved stability of flavor during storage and superior flavor development.

**[Means of Solving the Problem]** A mixture of flavoring with emulsifier and bulking agent or a mixture containing a bulking agent with emulsifying properties with palatinose and/or raffinose is prepared, then spray-dried to obtain a powdered flavoring.

## **Claims**

1. Method of manufacturing a powdered flavoring characterized by the fact that a mixture of flavoring with emulsifier and bulking agent or a mixture containing a bulking agent with emulsifying properties with palatinose and/or raffinose is prepared, then spray-dried to obtain a powdered flavoring.

2. Method of manufacturing a powdered flavoring in accordance with Claim 1, wherein the mixture contains an antioxidant.

3. Product containing the powdered flavoring in accordance with Claim 1 or 2.

## **[Detailed Description of the Invention]**

### **[0001]**

### **[Technical Field of the Invention]**

The invention relates to a method of manufacturing a powdered flavoring with superior taste properties and to a product containing said powdered flavoring. Further, the invention relates to a method of manufacturing a powdered flavoring featuring superior stability of the flavor during storage and elevated flavor development properties.

### **[0002]**

**[Prior Art]** Powdered flavors are widely used, for example, for dusting food products, and numerous methods are known for manufacturing them. Representative manufacturing methods include the method of spray-drying an emulsified composition obtained by adding a flavoring to a mixture of emulsifier and bulking agent, and the method of adding a powdering flavoring to a product such as gum arabic, then spray-drying the emulsified composition obtained to obtain a powdered flavoring. However, the powdered flavorings obtained by these methods have not been fully satisfactory in terms of taste properties, such as stability of flavor during storage and taste development. Known methods for improving the stability of flavor during storage include adding trehalose to the powdered flavoring (Tokkai 1997-111284). However, in this technique, although the storage stability of the flavor is appreciably improved, the development of a powdered flavoring with improved taste properties is still desired.

### **[0003]**

### **[Problem to be Solved by the Invention]**

The purpose of the invention is to provide a powdered flavoring that affords improved storage stability of the taste and superior taste development.

### **[0004]**

**[Means of Solving the Problem]** The inventors conducted intensive research aimed at solving this problem and discovered that by adding fructose and palatinose to the powdered flavoring, both the stability of the flavor during storage and the taste development were improved. This finding was refined with further research, and the invention was devised on the basis of this discovery. Hence, the invention is

1) a method of manufacturing a powdered flavoring characterized by the fact that a mixture of flavoring with emulsifier and bulking agent or a mixture containing a bulking agent with emulsifying properties with palatinose and/or raffinose is prepared, then spray-dried to obtain a powdered flavoring;

2) a method of manufacturing a powdered flavoring wherein the mixture contains an antioxidant,

3) a product containing said powdered flavoring.

[0005]

**[Reduction of the Invention to Practice]**

The invention is described in detail in the following. The inventive flavoring can be any flavoring that is used in the production of a powdered flavoring. Thus, one can use, for manufacturing the powdered flavoring, synthetic flavorings such as citral, geraniol, 1-menthol or vanillin; flavorings derived from animal products such as meat and seafood extracts; flavorings of vegetable origin such as essential oils and oleoresins; or compound flavorings consisting of suitable mixtures of these flavorings. Further, one can use, for example, citrus-type flavorings such as orange, lemon and grapefruit; fruit-type flavorings such as apple, banana, grape, peach, strawberry, melon and pineapple; mint-type flavorings such as peppermint and spearmint; spice-type flavorings such as pepper, cinnamon, nutmeg and cloves; nut-type flavorings such as vanilla, coffee, cocoa and hazelnut; meat and seafood type flavorings such as beef, pork, chicken, salmon, crab and lobster; tea-type flavorings such as red tea and green tea; and dairy-type flavorings such as milk and cheese. Naturally, however, the flavorings are not limited to these.

[0006] The bulking agents will now be discussed. The term bulking agents as used herein refers to components used to produce powdered flavorings, ie, to ordinary components used in the manufacture of powdered flavorings. Generally speaking, these are classified into bulking agents with emulsifying properties and other bulking agents, although sometimes there is no clear-cut distinction between the two. The former type, emulsifying bulking agents, pertains to bulking agents that also function as emulsifiers, such as gum arabic, modified starches,  $\alpha$ -cyclodextrin,  $\beta$ -cyclodextrin,  $\gamma$ -cyclodextrin, branched cyclodextrin, soya polysaccharides and gelatin. Particularly suitable for use are gum arabic and modified starches. Further, suitable examples of the latter group, ie, other bulking agents, include dextrin, skim milk, lactose and oligosaccharides.

[0007] When the latter type of bulking agents is used, they must be combined with emulsifiers. Suitable emulsifiers for this use include polypropylene glycol fatty acid esters, sucrose fatty acid esters, sorbitan fatty acid esters and polyglycerin fatty acid esters. The above-mentioned bulking agents and emulsifiers can be used singly or in combination of one or more.

[0008] In the present invention, the use of at least palatinose or raffinose (referred to hereinafter as oligosaccharide) is an important characteristic. By using these compounds in the present invention, the taste characteristics of the flavor, particularly the taste development, is improved. Palatinose is a substance that was known prior to the present patent application. It is a structural isomer of sucrose manufactured by action of a transferase on sucrose to modify the glucose and fructose moieties with  $\alpha$ -1,6 linkage. Raffinose is also a substance that was known prior to the present application. It is a trisaccharide comprised of galactose, glucose and fructose.

[0009] The proportions of the above-specified ingredients to be used will now be explained. Although the amount of flavoring used will vary depending on the type and taste intensity of the flavoring agent and the intended use of the powdered flavoring, the amount will range from 1 to 40 wt%; preferably 5-25 wt% as against solids in the powdered flavoring. The amount of emulsifying bulking agent or other bulking agent used will vary depending on the selected substances and the flavoring added, but will range from 2 to 20 wt parts, preferably 3-16 wt parts per part by weight of flavoring, and will account for 5-80 wt% of the total powdered flavoring. If the amount used is below this range, the flavoring will be inadequately coated, whereas if more is used than is needed, the organoleptic quality of the finished flavored product will not be adequate. In the event the bulking agent used does not have the emulsifying effect of a water-soluble dextrin, an emulsifier is added. The amount of emulsifier will vary depending on the amount of flavoring added and on the type of bulking agent and emulsifier used in combination, but generally, the amount used will be in the range of 1-10 wt parts by weight, preferably 5-7 parts by weight, per part by weight of the flavoring agent.

[0010] The amount of palatinose and raffinose (referred to hereinafter as oligosaccharide) used in the invention will vary depending on the type of oligosaccharide used, but the smallest amount used to

achieve the effect of adding oligosaccharide will be 5 wt% as against the inventive powdered flavoring (as against solids). Further, the maximum amount of raffinose used is 90 wt%; the maximum amount of palatinose used is 70 wt%. These upper limit values are needed to maintain the form of the powdered flavoring.

**[0011]** In the invention, variations will occur depending on the flavoring used, but usually, it is important to the various above-specified components of the composition for water to be present. The proportion of the water depending on the components forming the composition and on the manufacturing method used to make the powdered flavoring, but by way of illustration, the following explanation will use spray-drying as an example. When spray-drying is used under conditions of 150° C-180° C inlet temperature, 90° C-110° C outlet temperature, the moisture level will be 20-50%, preferably 30-40%, of the powdered flavoring, as against solids. If the flavoring agent is intended as a powdered flavoring for beverages, for example, water must definitely be present.

**[0012]** If an antioxidant is additionally added to the inventive composition, the stability of the powdered flavoring to oxidation is improved, and superior effects are obtained, for example, because of the improved taste quality. As long as the powdered flavoring can be produced, any antioxidant can be used, but specific examples include vitamin C, vitamin C palmitate and vitamin E. Of these, vitamin E is best. The amount of these antioxidants used will vary depending on the type of flavoring and antioxidant, but will usually range from 0.005-2.0 wt parts per part of flavoring agent. Further, 0.01-1.0 wt part is preferred.

**[0013]** A known additive can be added to the inventive powdered flavoring. A suitable known additive will be a food or a food-approved additive, and as long as it can be added to the powdered flavoring, any additive may be selected. Examples of additives that can be used are pigments, acidulants, fruit juice, coffee and tea extracts.

**[0014]** The method of manufacturing the powdered flavoring can be any method known at the time of this application. Representative methods will be explained here, but the invention is not limited to such methods. As a concrete example, water, a bulking agent chosen from the above-specified group, the oligosaccharide, emulsifier as needed, water-soluble antioxidant and other water-soluble additives are mixed, then heated to sterilize. Subsequently, pre-weighed amounts of flavoring, oil-soluble antioxidant and other oil-soluble additives are added, and the system is mixed in a mixer such as a TK mixer to produce an emulsion. Subsequently, the emulsion is introduced into a spray-dryer and spray-dried, then sieved to obtain a powdered flavoring.

**[0015]** The powdered flavoring thus obtained can be added to food products. The food products to which it can be added are not particularly limited, but include, for example, a wide range of food products such as beverages, powdered beverages, candy, chewing gum, drop candy, chocolate and the like confections; desserts such as yogurt and ice cream, meat and seafood, and foods intended to be cooked at home on an electric range (frozen, canned). The amount of flavoring added to these foods with the powdered flavoring will vary widely depending on the type of powdered flavoring and the food or beverage to which it is added, but generally, it will be in the range of 0.1-5 wt%, preferably 0.5-3.0 wt%, as against the food or beverage. The flavoring method used will be any of a variety of known methods.

**[0016]**

**[Effects of the Invention]** Because the powdered flavoring has superior taste qualities, and in particular, superior shelf life, storage stability and taste development, it can confer excellent taste and appearance to foods for an extended period of time.

**[0017]**

**[Embodiments]**

In the following, the invention is explained on the basis of embodiments and comparative examples, but the invention is not limited to these embodiments. The recipes for the various embodiments and comparative examples are shown in Table 3 for clarity.

**[0018] Embodiment 1 (Palatinose)**

1000 g of gum arabic aqueous solution (30 wt% solids) and 80 g of palatinose were added to and dissolved in 233 g of water, and the solution was heated for 30 min at 80• C to sterilize. After cooling to 50• C, 20 g of lemon flavor was added. The solution was stirred for 20 min at 9000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.) to obtain an emulsion. Thus emulsion was spray-dried using a spray-dryer (APV, Ltd.), to obtain a powdered flavoring. The inlet temperature of the spray-dryer was set at 170• C and the outlet temperature at 100• C.

**[0019].** This powdered flavoring was subjected to an abuse test under the following conditions.

Abuse test conditions: 60• C for 5 weeks.

The powdered flavoring subjected to this test was evaluated by the method described below. The results obtained are shown in Tables 1 and 2.

**[0020]**

**[Test of the Effects] Test of Effects by an Expert Panel**

Organoleptic testing was done by an expert panel of 10. The evaluation was based on the stability of the flavor during storage. Specifically, a 0.1% aqueous solution of the powdered flavoring was prepared and was tested sensorially as against a control, ie, a product not subjected to abuse. For evaluation, the 10-member panel evaluated two items, ie, (1) the stability of the flavor during storage, and (2) the taste development. Each of these items was rated on a three-point scale. The table shows the number of panel members.

**(1) Storage Stability of the Flavor**

- A number of panelists who perceived no freshness of the flavor (lemon)
- B number of panelists who perceived ordinary freshness of the flavor (lemon)
- C number of panelists who perceived greatly superior freshness of flavor (lemon)

**(2) Taste Development**

- A weak development of the flavor (lemon) top note
- B ordinary development of the flavor (lemon) top note
- C superior development of the flavor (lemon) top note

**[0021] Embodiment 2 (Raffinose)**

A raffinose-containing powdered flavoring was prepared by the same process as that used in Embodiment 1 except that the palatinose was replaced with raffinose. An organoleptic evaluation was performed in the same manner as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0022] Comparative Example 1 (Control)**

1267 g of gum arabic aqueous solution (30 wt% solids) was added to 46 g of water and dissolved, and the solution was sterilized by heating for 30 min at 80• C. The solution was cooled to 50• C, 20 g of lemon flavor was added, and the solution was stirred for 20 minutes at 1000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.) to produce an emulsion. This emulsion was spray-dried using a spray-dryer (APV, Ltd.) (inlet temperature: 170• C; outlet temperature: 100• C) to produce a powdered flavoring. An organoleptic evaluation was performed by the same method used in Embodiment 1. The results are shown in the table.

**[0023] Comparative Example 2 (Control)**

A trehalose-containing powdered flavoring was prepared using the same method as in Embodiment 1 except that raffinose was replaced with trehalose. An organoleptic evaluation was performed by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0024] Embodiment 3 (Palatinose)**

1000 g of gum arabic aqueous solution (30 wt% solids), 0.2 g of antioxidant (vitamin E) and 80 g of palatinose were added to 234 g of water and dissolved, and the solution was then sterilized by heating for 30 min at 80• C. After this solution was cooled to 50• C, 20 g of lemon flavor was added. The solution was stirred for 20 min at 1000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.) to obtain an emulsion. The

emulsion was processed by the same method as in Embodiment 1 to obtain a powdered flavoring. An organoleptic evaluation was performed by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0025] Embodiment 4 (Raffinose)**

A raffinose-containing powdered flavoring was prepared by the same process as in Embodiment 3 except that the palatinose was replaced with raffinose. An organoleptic evaluation was performed by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0026] Embodiment 5 (Palatinose)**

A palatinose-containing powdered flavoring was obtained by the same process as in Embodiment 3 except that the vitamin E was replaced with vitamin C palmitate. An organoleptic evaluation was performed as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0027] Embodiment 6 (Raffinose)**

A raffinose-containing powdered flavoring was obtained by the same process as in Embodiment 5 except that the palatinose was replaced with raffinose. An organoleptic evaluation was conducted by the method used in Embodiment 1. The results obtained are given in Tables 1 and 2.

**[0028] Embodiment 7 (Palatinose)**

280 g of modified starch (Hi CAP) was added to 1334 g of water and dissolved, and the solution was then sterilized by heating for 30 minutes at 80°C. After the solution was cooled to 50°C, 20 g of lemon flavor was added. An emulsion was obtained by mixing for 20 min at 9000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.). This emulsion was processed by the same method as in Embodiment 1 to obtain a powdered flavoring. An organoleptic evaluation was conducted by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0029] Embodiment 8 (Raffinose)**

A raffinose-containing powdered flavoring was obtained by the same process as in Embodiment 7 except that the palatinose was replaced with raffinose. An organoleptic evaluation was conducted as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0030] Embodiment 9 (Palatinose)**

280 g of modified starch (Hi CAP) was added to 1334 g of water and dissolved, and the solution was then sterilized by heating for 30 minutes at 80°C. After the solution was cooled to 50°C, 80 g of lemon flavor was added. An emulsion was obtained by mixing for 20 min at 9000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.). This emulsion was processed by the same method as in Embodiment 1 to obtain a powdered flavoring. An organoleptic evaluation was conducted by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0031] Embodiment 10 (Raffinose)**

A raffinose-containing powdered flavoring was obtained by the same process as in Embodiment 9 except that the palatinose was replaced with raffinose. An organoleptic evaluation was conducted as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0032] Comparative Example 3**

1266 g of gum arabic aqueous solution (30 wt% solids) and 0.2 g of antioxidant (Vitamin E) were added to 47 g of water and dissolved, and the solution was sterilized by heating for 30 min at 80°C. The solution was cooled to 50°C, 20 g of lemon flavor was added, and the solution was stirred for 20 minutes at 9000 rpm in a TK mixer (Tokushuki Kakogyo, Ltd.) to produce an emulsion. This emulsion was processed by the same method as in Embodiment 1 to obtain a powdered flavoring. An organoleptic evaluation was performed by the same method as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0033] Embodiment 11 (Palatinose)**

A palatinose-containing powdered flavoring was obtained by the same process as in Embodiment 9 except that the 80 g of lemon flavor was replaced with 20 g of lemon flavor. An organoleptic evaluation was conducted by the method used in Embodiment 1. The results obtained are given in Tables 1 and 2.

**[0034] Embodiment 12 (Raffinose)**

A raffinose-containing powdered flavoring was obtained by the same process as in Embodiment 1 except that the palatinose was replaced with raffinose. An organoleptic evaluation was conducted as in Embodiment 1. The results obtained are shown in Tables 1 and 2.

**[0035]**

**[Table 1]**

**Table 1. Organoleptic test results (1).**

		Organoleptic Scores (Number of Panelists)		
		A	B	C
Embodiment	1	0	4	6
	2	0	3	7
	3	0	4	6
	4	0	4	6
	5	0	5	5
	6	0	3	7
	7	0	4	6
	8	0	5	5
	9	0	3	7
	10	0	4	6
	11	0	5	5
	12	0	4	6
Comparative Example	1	0	9	1
	2	0	7	3
	3	0	9	1

- A number of panelists who perceived no freshness of the flavor (lemon)  
B number of panelists who perceived ordinary freshness of the flavor (lemon)  
C number of panelists who perceived highly superior freshness of flavor (lemon)



[0036]  
[Table 2]

Table 2. Organoleptic test results (2).

		A	B	C
Embodiment	1	2	4	4
	2	3	4	3
	3	0	3	7
	4	0	4	6
	5	0	5	5
	6	0	6	4
	7	1	5	4
	8	2	4	4
	9	1	5	4
	10	2	4	4
	11	0	2	8
	12	0	2	8
Comparative Example	1	10	0	0
	2	4	4	2
	3	10	0	0

- A weak development of the flavor (lemon) top note
- B ordinary development of the flavor (lemon) top note
- C superior development of the flavor (lemon) top note

[0037]  
[Table 3]

**Table 3-1**

Embodiment No.		1	2	3	4	5	6
Flavoring	lemon flavor	20	20	20	20	20	20
Oligo-saccharide	palatinose	80		80	—	80	—
	raffinose	—	80	—	80		80
	trehalose	—	—	—	—	—	—
Emulsifier/ Bulking Agent	gum arabic	300	300	300	300	300	300
	modified starch	—	—	—	—	—	—
Anti-oxidant	vitamin C palmitate	—	—	—	—	0.2	0.2
	vitamin E	—	—	0.2	0.2	—	—

Each of the numbers expresses the number of g. Gum arabic is calculated as dry matter.

[0038]  
[Table 4]

**Table 3-2**

Embodiment No.		7	8	9	10	11	12
Flavoring	lemon flavor	20	20	80	80	20	20
Oligo-saccharide	palatinose	80		80	—	80	—
	raffinose	—	80	—	80	—	80
	trehalose	—	—	—	—	—	—
Emulsifier/ Bulking Agent	gum arabic	—	—	—	—	—	—
	modified starch	300	300	300	300	300	300
Anti-oxidant	vitamin C palmitate	—	—	—	—	—	—
	vitamin E	—	—	0.2	0.2	0.2	0.2

[0039]  
[Table 5]

Table 3-3

Embodiment No.		1	2	3
Flavoring	lemon flavor	20	20	20
Oligo-saccharide	palatinose	—	—	80
	raffinose	—	—	—
	trehalose	—	80	—
Emulsifier/ Bulking Agent	gum arabic	300	300	300
	modified starch	—	—	—
Antioxidant	vitamin C palmitate	—	—	—
	vitamin E	—	—	0.2